Ransburg

SERVICE MANUAL
LN-9623-00.1
March - 2013

HIGH VOLTAGE CONTROLLER

MODEL: A12311

IMPORTANT: Before using this equipment, carefully read SAFETY PRECAUTIONS, starting on page 1, and all instructions in this manual. Keep this Service Manual for future reference.

Service Manual Price: €25.00 (Euro)
$30.00 (U.S.)

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SAFETY

SAFETY PRECAUTIONS

Before operating, maintaining or servicing any Ransburg electrostatic coating system, read and understand all of the technical and safety literature for your Ransburg products. This manual contains information that is important for you to know and understand. This information relates to USER SAFETY and PREVENTING EQUIPMENT PROBLEMS. To help you recognize this information, we use the following symbols. Please pay particular attention to these sections.

A WARNING! states information to alert you to a situation that might cause serious injury if instructions are not followed.

A CAUTION! states information that tells how to prevent damage to equipment or how to avoid a situation that might cause minor injury.

A NOTE is information relevant to the procedure in progress.

While this manual lists standard specifications and service procedures, some minor deviations may be found between this literature and your equipment. Differences in local codes and plant requirements, material delivery requirements, etc., make such variations inevitable. Compare this manual with your system installation drawings and appropriate Ransburg equipment manuals to reconcile such differences.

Careful study and continued use of this manual will provide a better understanding of the equipment and process, resulting in more efficient operation, longer trouble-free service and faster, easier troubleshooting. If you do not have the manuals and safety literature for your Ransburg system, contact your local Ransburg representative or Ransburg.

⚠ WARNING

➤ The user **MUST** read and be familiar with the Safety Section in this manual and the Ransburg safety literature therein identified.

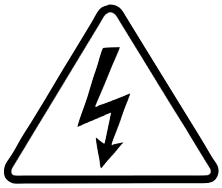
➤ This manual **MUST** be read and thoroughly understood by **ALL** personnel who operate, clean or maintain this equipment! Special care should be taken to ensure that the **WARNINGS** and safety requirements for operating and servicing the equipment are followed. The user should be aware of and adhere to ALL local building and fire codes and ordinances as well as **NFPA-33 SAFETY STANDARD, LATEST EDITION**, prior to installing, operating, and/or servicing this equipment.

⚠ WARNING

➤ The hazards shown on the following pages may occur during the normal use of this equipment. Please read the hazard chart beginning on page 2.

AREA Tells where hazards may occur.	**HAZARD** Tells what the hazard is.	**SAFEGUARDS** Tells how to avoid the hazard.
Spray Area 	**Fire Hazard** Improper or inadequate operation and maintenance procedures will cause a fire hazard. Protection against inadvertent arcing that is capable of causing fire or explosion is lost if any safety interlocks are disabled during operation. Frequent Power Supply or Controller shutdown indicates a problem in the system requiring correction.	Fire extinguishing equipment must be present in the spray area and tested periodically. Spray areas must be kept clean to prevent the accumulation of combustible residues. Smoking must never be allowed in the spray area. The high voltage supplied to the atomizer must be turned off prior to cleaning, flushing or maintenance. When using solvents for cleaning: • Those used for equipment flushing should have flash points equal to or higher than those of the coating material. • Those used for general cleaning must have flash points above 100°F (37.8°C). Spray booth ventilation must be kept at the rates required by NFPA-33, OSHA, country, and local codes. In addition, ventilation must be maintained during cleaning operations using flammable or combustible solvents. Electrostatic arcing must be prevented. Safe sparking distance must be maintained between the parts being coated and the applicator. A distance of 1 inch for every 10KV of output voltage is required at all times. Test only in areas free of combustible material. Testing may require high voltage to be on, but only as instructed. Non-factory replacement parts or unauthorized equipment modifications may cause fire or injury. If used, the key switch bypass is intended for use only during setup operations. Production should never be done with safety interlocks disabled. Never use equipment intended for use in waterborne installations to spray solvent based materials. The paint process and equipment should be set up and operated in accordance with NFPA-33, NEC, OSHA, local, country, and European Health and Safety Norms.

AREA Tells where hazards may occur.	**HAZARD** Tells what the hazard is.	**SAFEGUARDS** Tells how to avoid the hazard.
Spray Area 	**Explosion Hazard** Improper or inadequate operation and maintenance procedures will cause a fire hazard. Protection against inadvertent arcing that is capable of causing fire or explosion is lost if any safety interlocks are disabled during operation. Frequent Power Supply or Controller shutdown indicates a problem in the system requiring correction.	Electrostatic arcing must be prevented. Safe sparking distance must be maintained between the parts being coated and the applicator. A distance of 1 inch for every 10KV of output voltage is required at all times. Unless specifically approved for use in hazardous locations, all electrical equipment must be located **outside** Class I or II, Division 1 or 2 hazardous areas, in accordance with NFPA-33. Test only in areas free of flammable or combustible materials. The current overload sensitivity (if equipped) MUST be set as described in the corresponding section of the equipment manual. Protection against inadvertent arcing that is capable of causing fire or explosion is lost if the current overload sensitivity is not properly set. Frequent power supply shutdown indicates a problem in the system which requires correction. Always turn the control panel power off prior to flushing, cleaning, or working on spray system equipment. Before turning high voltage on, make sure no objects are within the safe sparking distance. Ensure that the control panel is interlocked with the ventilation system and conveyor in accordance with NFPA-33, EN 50176. Have fire extinguishing equipment readily available and tested periodically.
General Use and Maintenance 	Improper operation or maintenance may create a hazard. Personnel must be properly trained in the use of this equipment.	Personnel must be given training in accordance with the requirements of NFPA-33, EN 60079-0. Instructions and safety precautions must be read and understood prior to using this equipment. Comply with appropriate local, state, and national codes governing ventilation, fire protection, operation maintenance, and housekeeping. Reference OSHA, NFPA-33, EN Norms and your insurance company requirements.

AREA Tells where hazards may occur.	**HAZARD** Tells what the hazard is.	**SAFEGUARDS** Tells how to avoid the hazard.
Spray Area / High Voltage Equipment 	**Electrical Discharge** There is a high voltage device that can induce an electrical charge on ungrounded objects which is capable of igniting coating materials. Inadequate grounding will cause a spark hazard. A spark can ignite many coating materials and cause a fire or explosion.	Parts being sprayed and operators in the spray area must be properly grounded. Parts being sprayed must be supported on conveyors or hangers that are properly grounded. The resistance between the part and earth ground must not exceed 1 meg ohm. (Refer to NFPA-33.) Operators must be grounded. Rubber soled insulating shoes should not be worn. Grounding straps on wrists or legs may be used to assure adequate ground contact. Operators must not be wearing or carrying any ungrounded metal objects. When using an electrostatic handgun, operators must assure contact with the handle of the applicator via conductive gloves or gloves with the palm section cut out. NOTE: REFER TO NFPA-33 OR SPECIFIC COUNTRY SAFETY CODES REGARDING PROPER OPERATOR GROUNDING. All electrically conductive objects in the spray area, with the exception of those objects required by the process to be at high voltage, must be grounded. Grounded conductive flooring must be provided in the spray area. Always turn off the power supply prior to flushing, cleaning, or working on spray system equipment. Unless specifically approved for use in hazardous locations, all electrical equipment must be located **outside** Class I or II, Division 1 or 2 hazardous areas, in accordance with NFPA-33.

AREA Tells where hazards may occur.	**HAZARD** Tells what the hazard is.	**SAFEGUARDS** Tells how to avoid the hazard.
Electrical Equipment 	**Electrical Discharge** High voltage equipment is utilized in the process. Arcing in the vicinity of flammable or combustible materials may occur. Personnel are exposed to high voltage during operation and maintenance. Protection against inadvertent arcing that may cause a fire or explosion is lost if safety circuits are disabled during operation. Frequent power supply shutdown indicates a problem in the system which requires correction. An electrical arc can ignite coating materials and cause a fire or explosion.	Unless specifically approved for use in hazardous locations, the power supply, control cabinet, and all other electrical equipment must be located outside Class I or II, Division 1 and 2 hazardous areas in accordance with NFPA-33 and EN 50176. Turn the power supply OFF before working on the equipment. Test only in areas free of flammable or combustible material. Testing may require high voltage to be on, but only as instructed. Production should never be done with the safety circuits disabled. Before turning the high voltage on, make sure no objects are within the sparking distance.
Toxic Substances 	Certain material may be harmful if inhaled, or if there is contact with the skin.	Follow the requirements of the Material Safety Data Sheet supplied by coating material manufacturer. Adequate exhaust must be provided to keep the air free of accumulations of toxic materials. Use a mask or respirator whenever there is a chance of inhaling sprayed materials. The mask must be compatible with the material being sprayed and its concentration. Equipment must be as prescribed by an industrial hygienist or safety expert, and be NIOSH approved.
Spray Area 	**Explosion Hazard – Incompatible Materials** Halogenated hydrocarbon solvents for example: methylene chloride and 1,1,1,-Trichloroethane are not chemically compatible with the aluminum that might be used in many system components. The chemical reaction caused by these solvents reacting with aluminum can become violent and lead to an equipment explosion.	Aluminum is widely used in other spray application equipment - such as material pumps, regulators, triggering valves, etc. Halogenated hydrocarbon solvents must never be used with aluminum equipment during spraying, flushing, or cleaning. Read the label or data sheet for the material you intend to spray. If in doubt as to whether or not a coating or cleaning material is compatible, contact your coating supplier. Any other type of solvent may be used with aluminum equipment.

INTRODUCTION

GENERAL DESCRIPTION

The **Ransburg High Voltage Controller** (A12311-00 or FRA # EE-4526-300), in conjunction with an appropriate cascade (A12295-00 [FRA# EE-4526-800] or A12296-00 [FRA# EE- 4626-801]), is used to provide high voltage for electrostatic application equipment. The controller is packaged in a single package measuring 5.5" tall X 7.5" wide X 3.5 " deep. The controller can operate in “Local” and “Remote” conditions with either “Voltage Mode” or “Current Mode” of high voltage operation.

The Ransburg High Voltage Controller uses a combination of proven high voltage generation technology including microprocessor-based control with diagnostic and communication functions. It uses a variable voltage output to drive a cascade that amplifies the voltage to a high value. It also uses feedback with both current and voltage information to attempt to maintain actual value at set point. The processor circuitry provides the maximum in applicator transfer efficiency, while maintaining the maximum safety.

SAFETY FEATURES

When used with the appropriate applicators and cascades, the Ransburg High Voltage Controller provides the ultimate in operational safety. The protections include Overvoltage, Overcurrent, Di/Dt and Dv/Dt. The microprocessor circuits allow the use of the output load curve control, which limits the high voltage output to safe levels when the controls are set responsibly and safe distances are observed and followed.

DISPLAY

The front panel displays the high voltage and current output from the cascade as true readings. They are derived from feedback signals in the low voltage cable between the controller and the cascade.

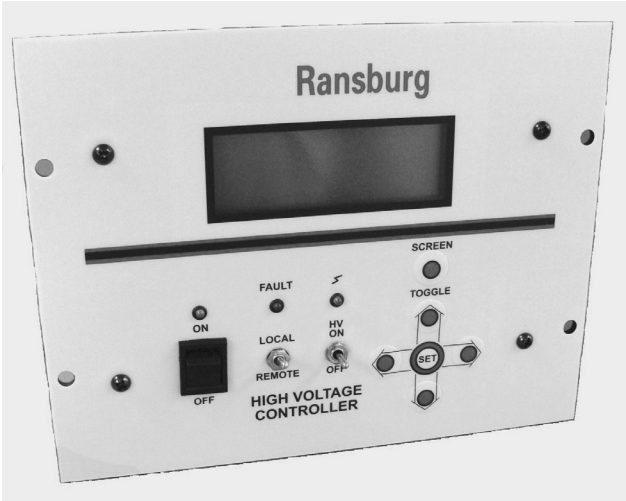


Figure 1: High Voltage Controller

SPECIFICATIONS

Environmental / Physical

Operating Temperature: 0°C to +55°C

Storage and Shipping Temperature: -40°C to +85°C

Humidity: 95% Non-Condensing

Physical Size: 5.5" tall X 7.5" wide X 3.5" deep

Electrical

Power Required: 24VDC ± .5 V @ 2.5 Amps maximum (@ sea-level), regulated, with over-voltage protection.

Note: For every 1000 ft. of increased elevation, the maximum current is increased by 3%.

High Voltage Output: 24 Volts, 1Amp, Form C relay contact

Controller Operating Range

High Voltage: 0-100kV, settable in 1kV increments

Current: 0-150 microamps

Communication Requirements

Control and Reporting: Ethernet IP

Note: A unique MAC ID address is hard coded into each High Voltage Controller. User con-trols must be configured to recognize each unique ad-dress.

Internal Controller Scan Time: 1 ms (all data is taken from a rolling average of 8 scans)

NOTES

PASSWORD PROTECTION

High Voltage Controller parameters will be password protected to prevent an unqualified operator from changing the values.

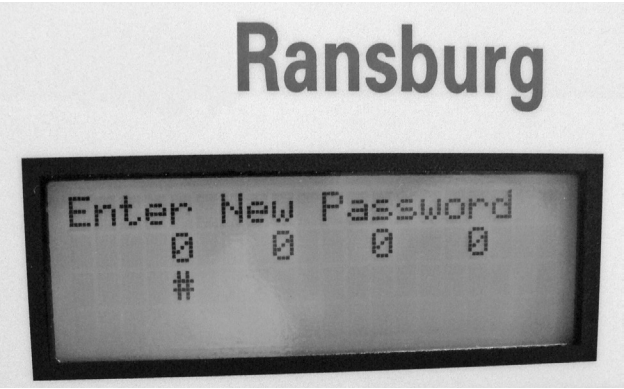


Figure 2: Password Screen

OPERATOR INTERFACE

The High Voltage Controller has a physically simple operator interface consisting of three (3) LED's (Light Emitting Diodes), three (3) switches, six (6) buttons, and a four line twenty character (4 X 20) alpha/numeric display.

SWITCHES

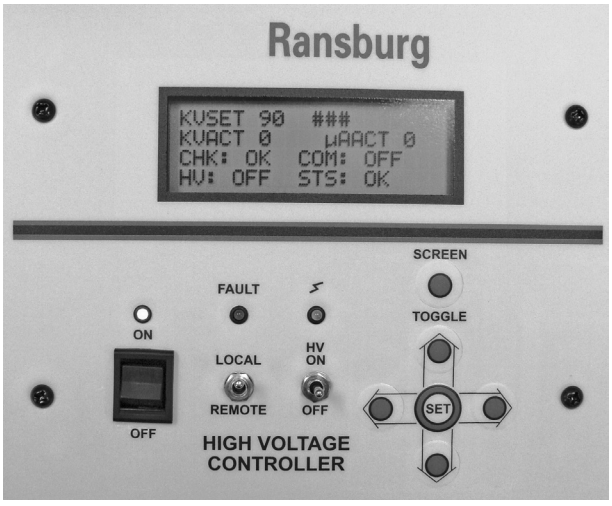


Figure 3: Power Switch

Power Switch

The rocker switch on the left and the LED directly above it are for power On/Off selection and display. The green LED is on when the power is On to the controller.

Local/Remote Switch

This is used to determine if the Local (Front Panel) controls have priority or if the Remote (Ethernet Connection) controls have priority. If the switch is up (Local Mode) the Front Panel controls may change parameters, enable or disable the high voltage, and clear faults. The Remote Ethernet connection may look at parameters and values, but may not change them or enable/disable the high voltage output. If the switch is down (Remote Mode) the opposite is true except that the Front Panel switch may be changed to local Mode at any time to disable the Remote Controls and to enable the Local Controls.

HV On/Off Switch

This is a floating toggle switch. It is active if the Local/Remote mode switch is in Local. It is used to enable and disable the High Voltage output and to clear system faults. When the System Checks and Current Status are OK flipping the switch to the up position (HV On) will enable High Voltage Output (see "Figure 3 - Power Swtich" in this section). Flipping it to the down position (HV Off) will disable the High Voltage Output. If there is a system fault, flipping this switch to the OFF position (also known as the Reset position) it will reset (clear) any faults currently detected by the system.

LED'S

Power LED

If the Green Power LED is on, then the system power to the controller is On.

Fault LED
The red Fault LED is lit when the system detects a fault condition (see "Figure 3 - Power Switch" in this section). When operating in "Local Mode", it is cleared by flipping the HV On/Off switch to the Off (Reset) position. If the system is still in a fault condition, it will immediately be lit as the system detects the fault.

High Voltage LED
The green High Voltage LED displays the current state of the High Voltage Output. This LED is illuminated whenever High Voltage is being supplied.

BUTTONS

The six buttons used to control the viewing and entry of information on the 4 X 20 character display are:

Screen Button
The Screen Button (at the top) is used to change (toggle) to the next Menu screen. The menu screens wrap around so that after the last screen it will return to the first screen.

Up and Down Buttons
The buttons above and below the Set Button in the middle (the Up and Down Buttons) are used to change which value on the screen is to be changed.

Set Button
This labeled button (in the middle) is used to select the value to change and to enter the change after it has been made.

Increase and Decrease Buttons
The buttons to the right and left of the Set Button are the Increase and Decrease Buttons. They are used to change the value selected by the Set Button.

NOTES

INSTALLATION

INSTALLATION

Figure 4: Installation

MOUNTING

Using four (4) each 10" X 32" or M-5 screws (not included), secure the front panel of the High Voltage Controller, using the supplied mounting holes, to enclosure.

INPUT POWER CONNECTIONS

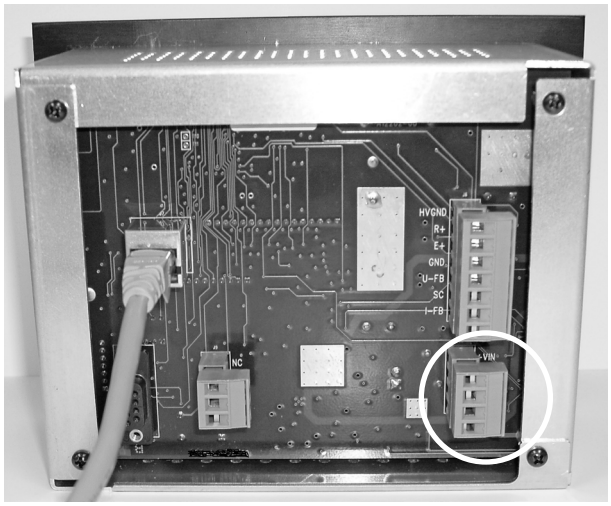


Figure 5: Input Power Connections

Input power must be supplied from a regulated DC power Supply. The connection is made at J8 with +VIN at 24VDC ± .5V, GND at 24VDC return, CGND at Earth Ground. The 24 VDC supply must be protected against excessive current as well as Over Voltage protected.

NOTE

► The Ransburg High Voltage Controller has a built in resettable fuse so if it draws a current in excess of 2.5 amps it will open. Reset is achieved by turning controller power OFF for 5 minutes then back ON.

ETHERNET CONNECTOR

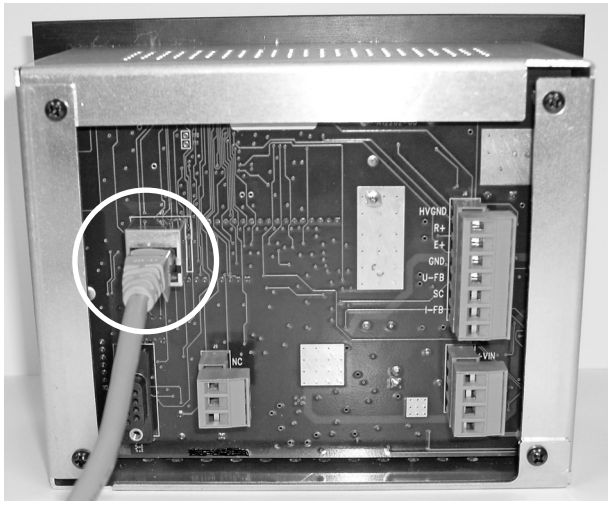


Figure 6: Ethernet Connector

Use the appropriate 10/100BASE Ethernet wiring (Straight EIA/TIA 568A) for your installation using a RJ-45 plug to connect to the High Voltage Controller.

INTERLOCK CONNECTION

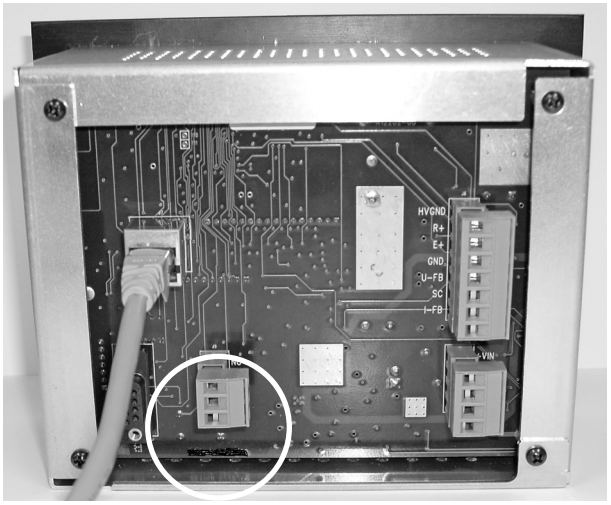


Figure 7: Interlock Connection

J9 is supplied to give a hardwire connection thru relay dry contacts (rated at 24 VDC @ 1 amp maximum) for when the controller operating power is turned OFF or a fault condition exists. They are marked as COM (Common) NC (normally closed) or NO (normally open) and can be used by end-user.

OUTPUT TO CASCADE

Make connections from J6 of the controller to, the cascade per the following table.

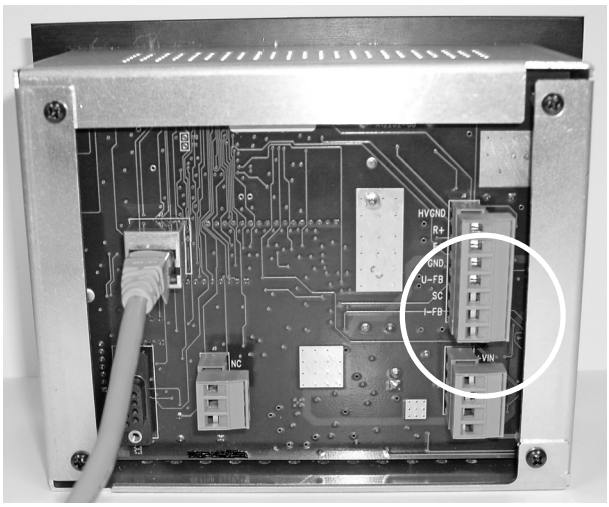


Figure 8: Output to Cascade

TABLE 1	
HVC-J6	**Cascade** A12295-00 (FRA# EE-4526-800) or A12296-00 (FRA# EE- 4626-801)
HVGND	Pin 1 OVDC for R+ and E+ Power
R+	Pin 2 Analog DC Cascade Drive Signal
E+	Pin 3 Nominal 15VDC for Cascade Electronics
GND	Pin 4 0VDC for Analog Cascade Voltage Feedback
U-FB	Pin 5 Analog Cascade Voltage Feedback Signal
SC	Pin 6 0VDC for Analog Cascade Current Feedback
I-FB	Pin 7 Analog Cascade Current Feedback Signal

RS232 CONNECTOR

This connector is a service connection for the Ransburg factory.

OPERATION

MENUS AND OPERATION

On all of the menus, if there is a parameter that can be changed there are a number of "#" characters to show that it is an enterable value. If there is more than one enterable value, pressing the Up or Down Buttons will move the "#'s" to the next changeable value. When the "#'s" are next to the value you wish to change, press the Set Button. This will bring up the Password Menu to allow you to enter the password and change the value. Once the password has been entered, it will remain active for an appropriate amount of time and then time out, requiring you to re-enter it.

When a valid password has been entered for any value (even if the value has not been changed) different menus will be available. These Menus are the Display Contrast Menu, the IP Address Menu, and the Enter New Password Menu.

When a numeric value is being changed (using the buttons to the left and right of the SET Button) the numeric will increase with the right button and decrease with the left button until it passes the maximum or minimum allowed value at which time it will "roll over" to the other limit.

Start-Up Menu

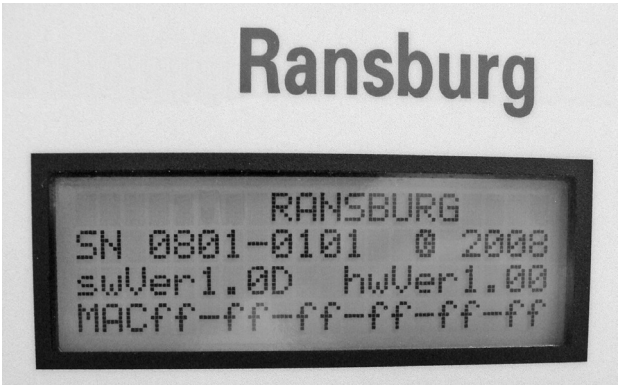


Figure 9: Start-Up Menu Screen

This is the menu that displays on the unit for 5 seconds (approximately) at power up. It displays the Model Number, Copyright Date, Serial Number, Software Version, and Hardware Version of the unit. It then changes to the Run Menu. If the Set Button is pressed while this menu is still up, the system changes to the display contrast Menu automatically to allow for contrast adjustment on initial power up.

Run Menu

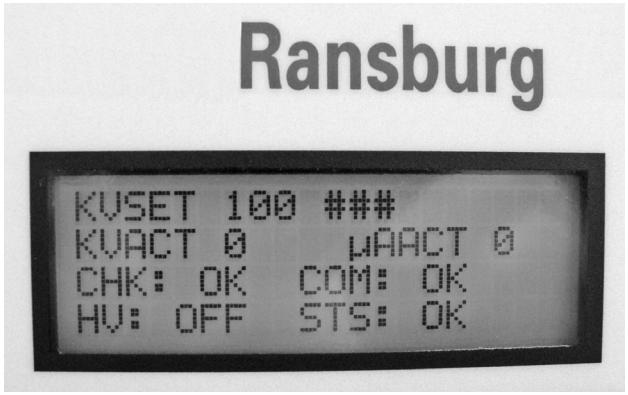


Figure 10: Run Menu Screen

This menu displays the setpoint (KVSET if in Voltage Mode, uASET if in Current Mode), the current actual KV value, the current uA value, the current hardware check value, the High Voltage status, and the current controller status. The setpoint (KVSET or uASET) is the only changeable value on this menu.

Mode Menu

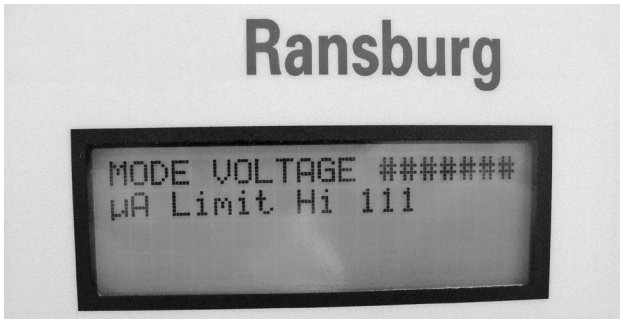


Figure 11: Voltage Mode Screen

This menu displays the current mode (Voltage or Current) and the high and low limits allowed for the Dependent Value in that mode. All of these values are changeable values.

Sensitivity Menu

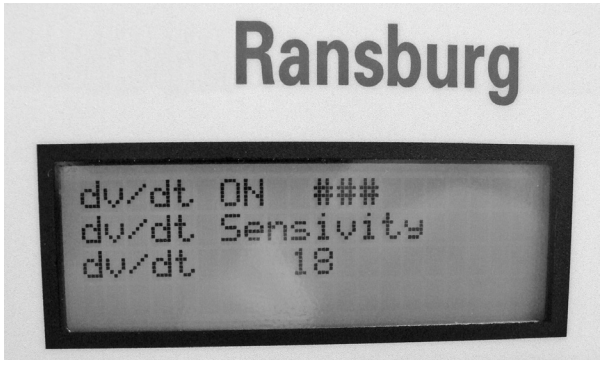


Figure 12: Sensitivity Menu Screen

This menu displays the current di/dt or dv/dt limit value and the enable status for di/dt or dv/dt depending on the mode. These are changeable values. If the current/voltage changes greater than this value within approximately 100ms, a fault signal is issued.

Fault Menu

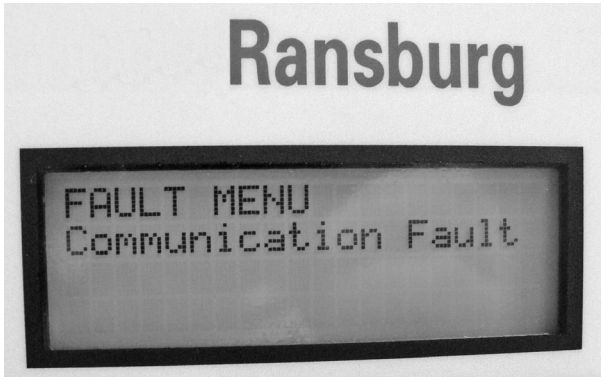


Figure 13: Fault Menu Screen

This menu displays the latest fault and is displayed automatically upon the fault detection.

Display Contrast Menu

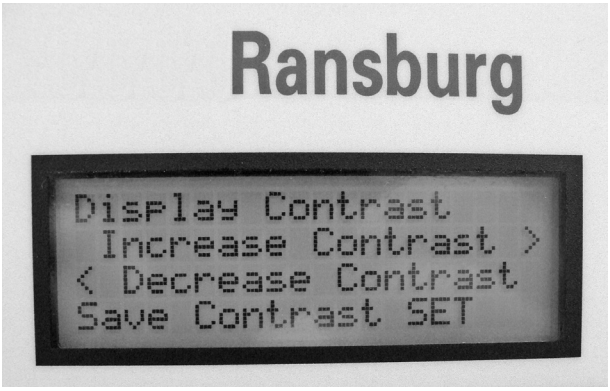


Figure 14: Display Contrast Menu Screen

below the password digit being changed instead of beside them. When the new password is entered, it will now be used for all values being changed.

IP Address Menu

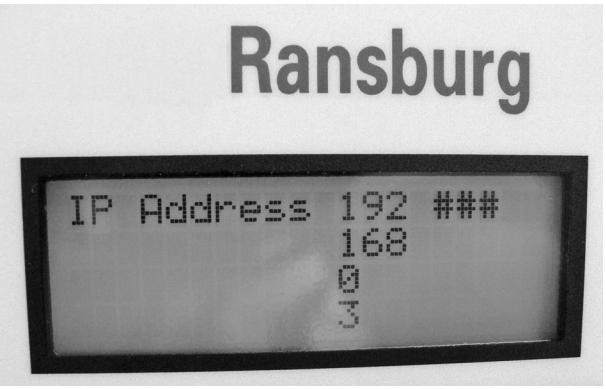


Figure 14: IP Address Menu Screen

This menu allows the setting of the units IP Address. When the new IP Address has been entered, the unit must have the power cycled before the new IP Address will be used.

Password Menu

This menu is different in that the "#'s" are displayed below the password digit being changed instead of beside them. When the password is entered, the menu will return to the value being changed.

Enter New Password Menu

This menu is different in that the "#'s" are displayed below the password digit being changed instead of beside them. When the new password is entered, it will now be used for all values being changed.

PARAMETERS AND SETTINGS

Mode

The operating mode can be set to either Voltage or Current mode. The mode selection determines which independent setpoint is the basis for control.

kVSet

This is the voltage setpoint, used in Voltage Mode. The system attempts to keep the voltage at this value.

uASet

This is the current setpoint, used in Current Mode. The system attempts to keep the current at this value.

kV Limit Hi

This parameter determines the level where a kV Limit Fault occurs. When the voltage rises above this value, it issues a kV Limit Fault. It only applies in Current Mode.

kV Limit Lo

This parameter determines the level where a kV Limit Fault occurs. When the Voltage falls below this value, it issues a kV Limit Fault. It only applies in Current Mode.

uA Limit Hi

This parameter determines the level where a Current Limit Fault occurs. When the current rises above this value, it issues a Current Limit Fault. It only applies in Voltage Mode.

Di/dt Sensitivity

When a rapid current change occurs where current rises faster than this value in approximately 100ms, it issues a di/dt fault. This is only active in Voltage Mode.

Dv/dt Sensitivity

When a rapid voltage change occurs where voltage falls faster than this value in approximately 100ms it issues a dv/dt fault. This is only active in Current Mode.

CONTROL CONDITIONS

Power Up
On power up, the system does several checks to determine hardware status. It checks various signals to determine that there are no faults, including feedback from the Variable Voltage Output and High Voltage Inputs to determine system status. If it determines that it is OK to start, the Check display on the run menu changes from NoGo to OK and System Status changes to OK.

HV On
When the HV On signal is received, the system status changes to "Starting" and the Variable Voltage Output is increased until the Indpendent Value rises to within a tolerance window (currently +/-3) of the setpoint value. Then the System Status changes to "Running".

Setpoint Changed
If the setpoint changes outside the control window, the status changes to "Rising" or "Falling" until the Independent Value again reaches the window at which point it returns to "Running".

HV Off
On HV Off the system immediately sets the Variable Voltage Output to zero volts, disables the HV Relay and goes to Stop Mode. The System Check goes to NoGo until the High Voltage and Variable Voltage Output feedback again reach the pre-determined value.

SYSTEM STATUS (STS)

OK
System is off and ready to start.

Starting/Rising/Falling
System is changing from one voltage/current value to another. Di/dt and dv/dt checks are disabled.

Running
System is attempting to keep a steady value on Setpoint (the Independent Value). All enabled checks are active.

Stopping
System is off and waiting to transient voltages/currents to stop.

Warning
System has detected a current or voltage condition within 10% of the limit settings.

Fault
System has detected a fault condition, stopped and will not allow starting until the fault is cleared. If the fault condition has not been cleared, it may immediately fault without starting.

SYSTEM CHECK (CHK)

OK
System has passed the checks and is ready to start.

NoGo
System has detected excessive voltage on the High Voltage or Variable Voltage Output Feedbacks and will not allow a start.

ETHERNET IP INTERFACE

The Ethernet IP Interface is defined as a set of four 16 bit IO words of input and a set of four 16 bit words of output. The Ethernet IP Input Assembly is defined as object 0 X 70 and the Ethernet IP Output Assembly is defined as object 0 X 71. The bit definitions are in the following table:

ETHERNET IP INPUT BIT DEFINITIONS TABLE 1

Input Object (0x70)	Word 0	Word 1	Word 2	Word 3
Bit 0	Enable Control	KV Setpoint	Parameter Value	Unused
Bit 1	Reset Faults	KV Setpoint	Parameter Value	Unused
Bit 2	Current Mode	KV Setpoint	Parameter Value	Unused
Bit 3	Unused	KV Setpoint	Parameter Value	Unused
Bit 4	Unused	KV Setpoint	Parameter Value	Unused
Bit 5	Unused	KV Setpoint	Parameter Value	Unused
Bit 6	Unused	KV Setpoint	Parameter Value	Unused
Bit 7	Unused	KV Setpoint	Parameter Value	Unused
Bit 8	Unused	uA Setpoint	Parameter Select Code	Parameter Select Code
Bit 9	Unused	uA Setpoint	Parameter Select Code	Parameter Select Code
Bit 10	Unused	uA Setpoint	Parameter Select Code	Parameter Select Code
Bit 11	Unused	uA Setpoint	Parameter Select Code	Parameter Select Code
Bit 12	Unused	uA Setpoint	Parameter Select Code	Parameter Select Code
Bit 13	Unused	uA Setpoint	Parameter Select Code	Parameter Select Code
Bit 14	Unused	uA Setpoint	Parameter Select Code	Parameter Select Code
Bit 15	Unused	uA Setpoint	Parameter Write Strobe	Parameter Read Strobe

Input Word 0

Bit 0 - Enable Control

When this bit is set (high) the system will attempt to keep the actual at the appropriate setpoint.

Bit 1 - Reset Faults

When this bit is changed from low to high (cleared to set) the system will clear any fault bits if any are set and will set the communication fault if no fault bits are set.

Bit 2 - Current Mode

When this bit is set, the system will operate in the Current Control Mode and when cleared will operate in the Voltage Control Mode.

Bit 3 (3-15) - Unused

These bits are currently undefined and unused.

Input Word 1

Bits (0-7) - kV Setpoint

This byte (8 bit) value determines the active Voltage setpoint in kV.

Bits (8-15) - uA Setpoint

This byte (8 bit) value determines the active Current setpoint in uA.

Input Word 2

Bits (0-7) - Parameter Value

These bits are currently undefined and unused.

Bit (8-14) - Parameter Select Code

This 7 bit value determines the parameter to change.

Bit 15 - Parameter Write Strobe

When this bit changes from cleared to set, the parameter value is written into the selected parameter and displayed in the Output Word 2.

Input Word 3

Bits (0-7) - Unused

These bits are currentely undefined and unused.

Bits (8-14) - Parameter Select code

The 7 bit value determines the parameter to change.

Bit 15 - Parameter Read Strobe

When this bit changes from cleared, to set the Current Parameter Value is read from the selected parameter and displayed in the Output Word 3.

ETHERNET IP OUTPUT BIT DEFINITIONS TABLE 2

Output Object (0x71)	Word 0	Word 1	Word 2	Word 3
Bit 0	In Control	Over Current Warning	Parameter Data Value	Actual KV Value
Bit 1	Ramping	Over Voltage Warning	Parameter Data Value	Actual KV Value
Bit 2	OK to Start	Under Voltage Warning	Parameter Data Value	Actual KV Value
Bit 3	Remote Mode	Unused	Parameter Data Value	Actual KV Value
Bit 4	Warning	Unused	Parameter Data Value	Actual KV Value
Bit 5	Fault	Unused	Parameter Data Value	Actual KV Value
Bit 6	Current Mode	Communications Fault	Parameter Data Value	Actual KV Value
Bit 7	Unused	Hardware Fault	Parameter Data Value	Actual KV Value
Bit 8	Unused	Low Voltage Fault	Parameter Select Code	Actual uA Value
Bit 9	Unused	dv/dt Fault	Parameter Select Code	Actual uA Value
Bit 10	Unused	di/dt Fault	Parameter Select Code	Actual uA Value
Bit 11	Unused	Minimum Output Fault	Parameter Select Code	Actual uA Value
Bit 12	Unused	Maximum Output Fault	Parameter Select Code	Actual uA Value
Bit 13	Unused	Over Voltage Fault	Parameter Select Code	Actual uA Value
Bit 14	Unused	Over Current Fault	Parameter Select Code	Actual uA Value
Bit 15	Heartbeat	Cable Fault	Parameter Display ACK	Actual uA Value

Output Word 0

Bit 0 - In Control

This bit is set when control is enabled and the control value has closed within three of the setpoint. This does not mean that the value is still within three of the setpoint, but that it had been at one time.

Bit 1 - Ramping

This bit is set when the setpoint has been changed and the current value has not come within three of the setpoint yet. During the time it is set, the di/dt and dv/dt are not active.

Bit 2 - OK to Start

This bit is set when the system determines that the current voltage values are in a range where it is allowed to start control.

Bit 3 - Remote Mode

This bit is set when the front panel switch is set to remote in order to allow remote control of the system.

Bit 4 - HV On Echo

This bit is set whenever HV is ON

Bit 5 - Warning

This bit is set whenever any warning is in effect.

Bit 6 - Fault

This bit is set whenever any fault is in effect (see "Fault Descriptions" in "Troubleshooting Guide" in the "Maintenance" section).

Bit (7-14) - Unused

These bits are currently undefined and unused.

Bit 15 - Heartbeat

This bit changes state every 1/4 second producing two pulses per second.

Output Word 1

Bit 0 - Over Current Warning

The current value is within 10% of the upper limit.

Bit 1 - Over Voltage Warning

The voltage value is within 10% of the upper limit in current mode.

Bit 2 - Under Voltage Warning

The voltage value is within 10% of the lower limit in current mode.

Bit (3-5) - Unused

These bits are currently undefined and unused.

Bit 6 - Communication Fault

The system has detected a communication failure after an Ethernet IP connection was initiated.

Bit 7 - Hardware Fault

The system has detected a fatal System Failure.

Bit 8 - Low Voltage Fault

The system has fallen below the kV Limit Lo in Current Mode.

Bit 9 - dv/dt Fault

The system has detected a di/dt event.

Bit 10 - di/dt Fault

The system has detected a di/dt event.

Bit 11 - Minimum Output Fault

The system has lowered the Variable Voltage Output to zero and still is above the setpoint.

Bit 12 - Maximum Output Fault

The system has raised the Variable Voltage Output to the system maximum, but could not reach the setpoint.

Bit 13 - Over Voltage Fault

The system has exceeded the kV Limit Hi or the Max System Limit.

Bit 14 - Over Current Fault

The current value has exceeded the Current (I) Limit Hi or the Max System Limit.

Bit 15 - Cable Fault

This bit is set whenever the voltage or current feedback from the cascade has been lost or fallen below the acceptable value.

Output Word 2

Bits (0-7) - Parameter Data Value

This byte (8 bit) tells the system the active parameter value.

Bits (8-14) - Parameter Select Code

This 7 bit value tells the system which parameter is being displayed.

Bit 15 - Parameter Acknowledge

When this bit changes from cleared to set a new Parameter Value is being displayed. It is cleared when the Parameter Read Strobe and Parameter Write Strobe are both cleared.

Output Word 3

Bits (0-7) - Actual kV Value

The byte (8 bit) value displays the latest voltage reading in kV.

Bits (8-15) - Actual uA Value

This byte (8 bit) value displays the latest current reading in uA.

NOTES

MAINTENANCE

TROUBLESHOOTING GUIDE

General Problem	Procedure	Solution
Blank Display	1. If the display is blank on initial power-up, it may be that the display contrast is not set correctly.	1. Cycle the Power on the unit. 2. Within 5 seconds, press the SET button. 3. Press and hold the right arrow button until the display contrast looks correct. 4. When the display contrast looks correct, press the SET button again.
Faults	1. No Fault 2. Current Limit Fault 3. Max Output Fault 4. Min Output Fault 5. kV Limit Fault 6. dv/dt Fault 7. di/dt Fault 8. Voltage Cable Fault 9. Current Cable Fault 10. Low Voltage Fault 11. Hardware Fault 12. Communication Fault	1. No Fault was detected. 2. The current value has exceeded the I Limit Hi or the Max System Limit. 3. The system has raised the Variable Voltage Output to the system maximum, but could not reach the setpoint. 4. The system has lowered the Variable Voltage Output to zero and still is above the setpoint. 5. The system has exceeded the kV Limit Hi or the Max System Limit. 6. The system has detected a dv/dt event. 7. The system has detected a di/dt event. 8. The system has detected a loss of the High Voltage Feedback signal. 9. The system has detected a loss of the Current Feedback signal. 10. The system has fallen below the kV Limit Lo in Current Mode. 11. The system has detected a fatal System Failure. 12. The system has detected a communication failure after an Ethernet IP connection was initiated.

WARRANTY POLICIES

LIMITED WARRANTY

Ransburg will replace or repair without charge any part and/or equipment that falls within the specified time (see below) because of faulty workmanship or material, provided that the equipment has been used and maintained in accordance with Ransburg's written safety and operating instructions, and has been used under normal operating conditions. Normal wear items are excluded.

THE USE OF OTHER THAN RANSBURG APPROVED PARTS, VOID ALL WARRANTIES.

SPARE PARTS: One hundred and eighty (180) days from date of purchase, except for rebuilt parts (any part number ending in "R") for which the warranty period is ninety (90) days.

EQUIPMENT: When purchased as a complete unit, (i.e., guns, power supplies, control units, etc.), is one (1) year from date of purchase. **WRAPPING THE APPLICATOR, ASSOCIATED VALVES AND TUBING, AND SUPPORTING HARDWARE IN PLASTIC, SHRINK-WRAP, OR ANY OTHER NON-APPROVED COVERING, WILL VOID THIS WARRANTY.**

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EXCLUSIONS:

If, in Ransburg's opinion the warranty item in question, or other items damaged by this part was improperly installed, operated or maintained, Ransburg will assume no responsibility for repair or replacement of the item or items. The purchaser, therefore will assume all responsibility for any cost of repair or replacement and service related costs if applicable.

Service Manual Price: **€25.00 (Euro)**
$30.00 (U.S.)

Manufacturing
1910 North Wayne Street
Angola, Indiana 46703-9100
Telephone: 260/665-8800
Fax: 260/665-8516
www.ransburg.com

Technical/Service Assistance
Telephone: 800/ 233-3366
Fax: 419/ 470-2071

Technical Support Representative will direct you to the appropriate telephone number for ordering Spare Parts.

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